A Case of *Klebsiella variicola* Infection

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A 57-year-old woman with a history of hypothyroidism and breast cancer, for which she had undergone a mastectomy 10 years prior, presented to the emergency department with a 1-day history of right lower-quadrant abdominal pain. The pain was associated with nausea, vomiting, fever, and chills. The patient worked in a school and described multiple ill contacts at her workplace. She denied any recent dietary changes, travel, diarrhea, or constipation.

On initial presentation, the patient was febrile (temperature, 38.9 °C), tachycardic (pulse rate, 158 beats/min), and hypertensive (blood pressure, 142/78 mm Hg). On physical examination, the patient’s abdomen was tender to palpation in the right lower quadrant, without overt signs of peritonitis. The Rovsing sign was positive (ie, palpation of the left lower quadrant increased the pain in the right lower quadrant), indicating possible appendicitis.

Her initial white blood cell (WBC) count was 15,900/µL with a left shift, and she had low serum levels of magnesium and phosphorous. Initial computed tomography scans of the abdomen and pelvis revealed an appendix measuring 1.1 cm diameter and a 7 × 4-mm appendicolith, consistent with acute necrotizing appendicitis. She was admitted to the hospital, was started on meropenem, and underwent a laparoscopic appendectomy.

On postoperative day 2, initial blood cultures obtained from the patient grew *Klebsiella variicola* and *Streptococcus* species. The patient had been progressing well postoperatively and denied any pain, nausea, vomiting, or fever. Her WBC count on postoperative day 2 had normalized to 6,500/µL, and the results of a comprehensive metabolic panel were unremarkable.

On postoperative day 3, the patient was found to have an elevated erythrocyte sedimentation rate of 55 mm/h and a normal C-reactive protein level of 4.14 mg/L. Findings of echocardiography were reported to be unremarkable. Meropenem was stopped, and the patient was discharged with a midline catheter for 2 weeks of infusions of ceftriaxone, 1 g.

**DISCUSSION**

*K variicola* is a Gram-negative, facultative anaerobic, nonmotile bacillus that is known for forming circular, convex, and mucoid colonies.1 This versatile bacterium is able to colonize a variety of hosts, including plants, animals, and insects, and is widely considered an emerging pathogen in humans.1 A member of the *Klebsiella pneumoniae* complex and the Enterobacteriaceae family, *K variicola* was first described in 2004 by Rovsing and colleagues.2 One distinguishing trait of *K variicola* compared with *K pneumoniae* is its ability to fix nitrogen, which facilitates its endophytic relationship with several plant species.3,4

As the *K pneumoniae* complex has been expanded in recent years to include numerous subspecies, often the varied taxa of the complex are misassigned as *K pneumoniae* due to overlapping biologic and phenotypic features.1 Among other methods, polymerase chain reaction (PCR) testing has emerged as a useful tool in differentiating specific *Klebsiella* species.1 Furthermore, as gene-sequencing technology improved, a proposal emerged to transfer certain *Klebsiella* species, such as *Klebsiella planticola*, *Klebsiella terrigena*, and *Klebsiella ornithinolytica* to the new genus *Raoutella*.1 This was based on *rpoB* gene sequencing, which showed a 6% *rpoB* sequence dissimilarity in certain *Klebsiella* species.1

Clinically, *K variicola* causes a wide range of health care–associated infections and community-acquired infections.1 *K variicola* is an opportunistic pathogen that causes can infect in the bloodstream, the respiratory tract, and the urinary tract.1 Recent studies have shown that bloodstream infections caused by *K variicola* carry a higher 30-day mortality rate compared with infections with *K pneumoniae*, indicating the need for further studies into the bacteria’s virulence and genetics.1 *K variicola* has also been associated with infections in immunocompromised patients, as well as those with comorbidities such as cancer, diabetes, and organ transplant.
Of note, in a case report by Seki and colleagues, a 67-year-old woman with maxillary sinus cancer was found to be septic after a course of chemotherapy. While initial blood culture results obtained from the patient identified *K pneumoniae*, based on an automated identification system, further PCR and genetic analysis showed the sample to be most consistent with *K variicola*. Although the patient was treated with antibiotics, including meropenem, she went on to develop disseminated intravascular coagulation and died from multiple organ failure 8 days later. Cases such as these highlight the important potential of the genetic analysis of blood samples along with blood cultures. Whereas traditional automated identification systems might mistake *K variicola* for *K pneumoniae*, genetic analysis of pathogens directly from the blood could allow for a more accurate and rapid detection of particular *Klebsiella* species. Clinically, this could allow for expedient and specific antibiotic treatments, especially in cases of severe sepsis. While our patient’s antibiotic management did not change based on the blood culture confirmation of *K variicola*, in more severe cases, time-saving using the genetic analysis of blood samples vs traditional blood cultures could prove beneficial.

In our patient, the bloodstream infection was likely caused intra-abdominally via the compromised appendix. Her prior history of breast cancer also put her at increased risk for infection with *K variicola*. In this patient’s case, prompt antibiotic treatment and quick identification of the specific bacteria and antibiotic sensitivities led to a successful medical course.

**REFERENCES:**